

## BMP C105: Stabilized Construction Entrance

### *Purpose*

Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of quarry spalls at entrances to construction sites.

### *Conditions of Use*

Construction entrances shall be stabilized wherever traffic will be leaving a construction site and traveling on paved roads or other paved areas within 1,000 feet of the site.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

### *Design and Installation Specifications*

- See Figure 4.2 for details. Note: the 100' minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').
- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:

Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.
- Hog fuel (wood-based mulch) may be substituted for or combined with quarry spalls in areas that will not be used for permanent roads. Hog fuel is generally less effective at stabilizing construction entrances and should be used only at sites where the amount of traffic is very limited. Hog fuel is not recommended for entrance stabilization in urban areas. The effectiveness of hog fuel is highly variable and it generally requires more maintenance than quarry spalls. The inspector may at any time require the use of quarry spalls if the hog fuel is not preventing sediment from being tracked onto pavement or if the hog fuel is being carried onto pavement. Hog fuel is prohibited in permanent roadbeds because organics in the subgrade soils cause degradation of the subgrade support over time.
- Fencing (see BMPs C103 and C104) shall be installed as necessary to restrict traffic to the construction entrance.

## BMP C126: Polyacrylamide for Soil Erosion Protection

### Purpose

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion.

Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration through flocculation and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

### Conditions of Use

PAM shall not be directly applied to water or allowed to enter a water body.

In areas that drain to a sediment pond, PAM can be applied to bare soil under the following conditions:

- During rough grading operations.
- Staging areas.
- Balanced cut and fill earthwork.
- Haul roads prior to placement of crushed rock surfacing.
- Compacted soil roadbase.
- Stockpiles.
- After final grade and before paving or final seeding and planting.
- Pit sites.
- Sites having a winter shut down. In the case of winter shut down, or where soil will remain unworked for several months, PAM should be used together with mulch.

### Design and Installation Specifications

PAM may be applied in dissolved form with water, or it may be applied in dry, granular or powdered form. The preferred application method is the dissolved form.

PAM is to be applied at a maximum rate of  $4\frac{2}{3}$  pound PAM per 1000 gallons water (80 mg/L) per 1 acre of bare soil. Table 4.8 and Figure 4.6 can be used to determine the PAM and water application rate for a disturbed soil area. Higher concentrations of PAM **do not** provide any additional effectiveness.

Table 4.8 PAM and Water Application Rates		
Disturbed Area (ac)	PAM (lbs)	Water (gal)
0.50	0.25	500
1.00	0.50	1,000
1.50	0.75	1,500
2.00	1.00	2,000
2.50	1.25	2,500
3.00	1.50	3,000
3.50	1.75	3,500
4.00	2.00	4,000
4.50	2.25	4,500

## **BMP C153: Material Delivery, Storage and Containment**

### **Purpose**

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in a designated area, and installing secondary containment.

### **Conditions of Use**

**These procedures are suitable for use at all construction sites with delivery and storage of the following materials:**

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g. Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents and curing compounds
- Any other material that may be detrimental if released to the environment

### **Design and Installation Specifications**

**The following steps should be taken to minimize risk:**

- Temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Surround with earth berms.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (Oct 1 – April 30), consider storing materials in a covered area.
- Store materials in secondary containments, such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, in secondary

containment.

- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.

**Material Storage Areas and Secondary Containment Practices:**

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain precipitation from a 25 year, 24 hour storm event, plus 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.
- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill clean-up material.

## **BMP C160: ~~Contractor-Certified Erosion and Spill-Sediment Control Lead~~**

### ***Purpose***

The ~~Contractor-project proponent~~ designates at least one ~~employee-person~~ as the responsible representative in charge of erosion and ~~spill-sediment control (ESC), and water quality protection.~~ —The designated ~~employee person~~ shall be the ~~Contractor-Certified Erosion and Spill-Sediment Control Lead (CESCL)~~ who is responsible for ensuring compliance with all local, state, and federal erosion and sediment control ~~and water quality~~ requirements.

### ***Conditions of Use***

A CESCL should be made available on project types that include, but are not limited to, the following:

- ~~Construction activity that disturbs one acre of land or moreSingle projects of 5 acres or more.~~
- ~~Construction activity that disturbs less than one acre of land, but is part of a larger common plan of development or sale that will ultimately disturb one acre of land or more. Projects less than 5 acres that are part of a larger project, or master plan.~~
- Heavy construction of roads, bridges, highways, airports, buildings.
- Projects near wetlands and sensitive or critical areas.
- Projects in or over water.
- The CESCL shall ~~have current certification proving attendance in the “Construction Site Erosion and Sediment Control Certification Course,” offered throughout the year by the Associated General Contractors of Washington Educational Foundation or an approved equivalent. Equivalent certificates include:~~
  - ~~Have a current certificate proving attendance in an erosion and sediment control training course that meets the minimum ESC training and certification requirements established by Ecology (see details below).~~

~~Ecology will maintain a list of ESC training and certification providers at: [www.ecy.wa.gov/programs/wq/stormwater](http://www.ecy.wa.gov/programs/wq/stormwater).~~

### **OR**

- ~~Be a Certified Professional in Erosion and Sediment Control (CPESC); for additional information go to: [www.cpesc.net](http://www.cpesc.net)~~

### ***Design and Installation Specifications***

~~WSDOT certification in Construction Site Erosion and Sediment Control.~~

~~Certified Professional in Erosion and Sediment Control (CPESC) offered by the International Erosion Control Association (IECA).~~

~~Other courses approved by Ecology or the Local Permitting Authority.~~

- Certification shall remain valid for three years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, on call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, fax number, and address of the designated CESCL.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.

Duties and responsibilities of the CESCL shall include, but are not limited to the following:

- Maintaining permit file on site at all times which includes the SWPPP and any associated permits and plans.
- Directing BMP installation, inspection, maintenance, modification, and removal.
- ~~Availability 24 hours per day, 7 days per week by telephone.~~
- Updating all project drawings and the Construction SWPPP with changes made.
- Keeping daily logs, and inspection reports. Inspection reports should include:
  - Inspection date/time.
  - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
  - A summary or list of all BMPs implemented, including observations of all erosion/sediment control structures or practices. The following shall be noted:
    - 1) Locations of BMPs inspected.
    - 2) Locations of BMPs that need maintenance.
    - 3) Locations of BMPs that failed to operate as designed or intended, and
    - 4) Locations of where additional or different BMPs are required.

- Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
- Any water quality monitoring performed during inspection.
- General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
- ~~• When, where and how BMPs were installed, removed, or modified.~~
- ~~• Repairs needed or made.~~
- ~~• Observations of BMP effectiveness and proper placement.~~
- ~~• Recommendations for improving performance of BMPs.~~
- ~~• Identify the points where storm water runoff potentially leaves the site, is collected in a surface water conveyance system (i.e., road ditch, storm sewer), and enters receiving waters of the state.~~
- ~~• If water sheet flows from the site, identify the point at which it becomes concentrated in a collection system.~~
- ~~• Inspect for SWPPP requirements including BMPs as required to ensure adequacy.~~
- Facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies or the owner.



## **Minimum Requirements for ESC Training and Certification Courses**

### **General Requirements**

1. The course shall teach the construction stormwater pollution prevention guidance provided in the most recent version of:
  - a. The Washington State Dept. of Ecology Stormwater Management Manual for Western Washington.
  - b. Other equivalent stormwater management manuals approved by Ecology.
2. Upon completion of course, each attendee shall receive an 8 ½ x 11” certificate and a wallet-sized card that certifies completion of the course. Certification shall remain valid for three years. Recertification may be obtained by completing the 8-hour refresher course or by taking the initial 16-hour training course again.
3. The initial certification course shall be a minimum of 16 hours (with a reasonable time allowance for lunch, breaks, and travel to and from field) and include a field element and test.
  - a. The field element must familiarize students with the proper installation, maintenance and inspection of common erosion and sediment control BMPs including, but not limited to, blankets, check dams, silt fence, straw mulch, plastic, and seeding.
  - b. The test shall be open book and a passing score is not required for certification. Upon completion of the test, the correct answers shall be provided and discussed.
4. The refresher course shall be a minimum of 8 hours and include a test.
  - a. The refresher course shall include:
    - i. Applicable updates to the Stormwater Management Manual that is used to teach the course, including new or updated BMPs; and
    - ii. Applicable changes to the NPDES General Permit for Construction Activities.
  - b. The refresher course test shall be open book and a passing score is not required for certification. Upon completion of the test, the correct answers shall be provided and discussed.
  - c. The refresher course may be taught using an alternative format (e.g. internet, CD ROM, etc.) if the module is approved by Ecology.

### **Required Course Elements**

1. Erosion and Sedimentation Impacts
  - a. Examples/Case studies
2. Erosion and Sedimentation Processes



- a. Definitions
- b. Types of erosion
- c. Sedimentation
  - i. Basic settling concepts
  - ii. Problems with clays/turbidity

### 3. Factors Influencing Erosion Potential

- a. Soil
- b. Vegetation
- c. Topography
- d. Climate

### 4. Regulatory Requirements

- a. NPDES - Construction Stormwater General Permit
- b. Local requirements and permits
- c. Other regulatory requirements

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### 5. Stormwater Pollution Prevention Plan (SWPPP)

- a. SWPPP is a living document – should be revised as necessary
- b. 12 Elements of a SWPPP; discuss suggested BMPs (with examples)
  - 1. Mark Clearing Limits
  - 2. Establish Construction Access
  - 3. Control Flow Rates
  - 4. Install Sediment Controls
  - 5. Stabilize Soils
  - 6. Protect Slopes
  - 7. Protect Drain Inlets
  - 8. Stabilize Channels and Outlets
  - 9. Control Pollutants
  - 10. Control De-watering
  - 11. Maintain BMPs
  - 12. Manage the Project

### 6. Monitoring/Reporting/Recordkeeping

- a. Site inspections/visual monitoring
  - i. Disturbed areas
  - ii. BMPs
  - iii. Stormwater discharge points
- b. Water quality sampling/analysis
  - i. Turbidity
  - ii. pH
- c. Monitoring frequency
  - i. Set by NPDES permit
  - ii. Inactive sites - reduced frequency
- d. Adaptive Management

- i. When monitoring indicates problem, take appropriate action (e.g. install/maintain BMPs)
    - ii. Document the corrective action(s) in SWPPP
  - e. Reporting
    - i. Inspection reports/checklists
    - ii. Discharge Monitoring Reports (DMR)
    - iii. Non-compliance notification

### **Instructor Qualifications**

1. Instructors must be qualified to effectively teach the required course elements.
2. At a minimum, instructors must have:
  - a. Current certification as a Certified Professional in Erosion and Sediment Control (CPESC), or
  - b. Completed a training program for teaching the required course elements, or
  - c. The academic credentials and instructional experience necessary for teaching the required course elements.
3. Instructors must demonstrate competent instructional skills and knowledge of the applicable subject matter.

## BMP C201: Grass-Lined Channels

<b>Purpose</b>	To provide a channel with a vegetative lining for conveyance of runoff. See Figure 4.9 for typical grass-lined channels.
<b>Conditions of Use</b>	<ul style="list-style-type: none"><li>—This practice applies to construction sites where concentrated runoff needs to be contained to prevent erosion or flooding.</li><li>• When a vegetative lining can provide sufficient stability for the channel cross section and at lower velocities of water (normally dependent on grade). This means that the channel slopes are generally less than 5 percent and space is available for a relatively large cross section.</li><li>• Typical uses include roadside ditches, channels at property boundaries, outlets for diversions, and other channels and drainage ditches in low areas.</li><li>• Channels that will be vegetated should be installed before major earthwork and hydroseeded with a <u>bonded fiber mulch (BFM)</u>. The vegetation should be well established (i.e., 75 percent cover) before water is allowed to flow in the ditch. With channels that will have high flows, erosion control blankets should be installed over the hydroseed. If vegetation cannot be established from seed before water is allowed in the ditch, sod should be installed in the bottom of the ditch in lieu of hydromulch and blankets.</li></ul>
<b>Design and Installation Specifications</b>	<ul style="list-style-type: none"><li>—Locate the channel where it can conform to the topography and other features such as roads.</li><li>• Locate them to use natural drainage systems to the greatest extent possible.</li><li>• Avoid sharp changes in alignment or bends and changes in grade.</li><li>• Do not reshape the landscape to fit the drainage channel.</li><li>• <u>The maximum design velocity shall be based on soil conditions, type of vegetation, and method of revegetation, but at no times shall velocity exceed 5 feet/second. The channel shall not be overtopped by the peak runoff from a 10-year, 24-hour storm, assuming a Type 1A rainfall distribution."</u></li><li>• <del>Design velocities are to be below 5 ft/sec.; however, the design velocity should be based on soil conditions, type of vegetation, and method of establishment.</del></li><li>• An <b>established</b> grass or vegetated lining is required before the channel can be used to convey stormwater, unless stabilized with nets or blankets.</li><li>• If design velocity of a channel to be vegetated by seeding exceeds 2 ft/sec, a temporary channel liner is required. Geotextile or special mulch protection such as fiberglass roving or straw and netting provide stability until the vegetation is fully established. See Figure 4.10.</li></ul>